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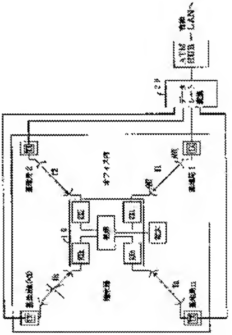
(54) COMMUNICATION METHOD AND COMMUNICATION EQUIPMENT FOR RADIO LAN SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a communication method and communication equipment for a radio LAN system having a macro diversity function realized by a low transmission output, a low antenna gain, and at a narrower transmission band even in broad band communication.



SOLUTION: The communication method for the radio LAN system making communication at a 1st transmission rate has each stage of (a): a signal of the 1st transmission rate is divided in time division into (n−1) sets of signals, where (n) is 3 or over, (b): each of the (n−1) sets of signals is converted into a signal of a 2nd transmission rate lower than the 1st transmission rate, and (c): the (n−1) sets of signals at the 2nd transmission rate are sent between (n−1) sets of base stations and a terminal station to which at least one terminal equipment is connected, and the required modulation wave versus noise ratio between the terminal station and the

base stations is reduced.

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CLAIMS

[Claim(s)]

[Claim 1]It is a correspondence procedure for a wireless LAN system which communicates with the 1st transmission rate, (a) Divide a signal of said 1st transmission rate into a signal of an individual (n-1) in time sharing. However, n changes each of a signal of 3 or more and the (b) aforementioned (n-1) individual into a signal of the 2nd transmission rate lower than said 1st transmission rate, (c) It has each stage where a base station of an individual (n-1) and at least one terminal transmit a signal of an individual (n-1) of said 2nd transmission rate between connected terminal stations, A correspondence procedure for wireless LAN systems, wherein a necessary modulated wave versus a noise ratio of a transmission line between said terminal station and said base station is reduced.

[Claim 2]The correspondence procedure for wireless LAN systems according to claim 1, wherein said 2nd transmission rate is 1 for said 1st transmission rate (n-1).

[Claim 3]Form said wireless LAN system further and at least one redundancy system base station n said correspondence procedure for wireless LAN systems, (d) a signal of data of each signal transmitted at least among the aforementioned (n-1) individuals between a base station of k (k<= (n-1)) individual, and said terminal station, and data which has a predetermined relation -- said terminal station and said at least one -- redundant -- between system base station n, [transmit and] (e) When one of the transmission lines between said at least k base stations and said terminal station is

covered, The correspondence procedure for wireless LAN systems according to claim 1 or 2 including further each stage where data of a covered transmission line is compensated, based on a signal transmitted between said at least one redundancy system base station and said terminal station.

[Claim 4]Data of a signal which transmits a predetermined relation of said stage (d) between said terminal station and said at least one redundancy system base station, The correspondence procedure for wireless LAN systems according to claim 3 being the sum for every arbitrary time slots of data of each signal transmitted between said at least k base stations and said terminal station.

[Claim 5]Form said wireless LAN system further and at least one redundancy system base station n said correspondence procedure for wireless LAN systems, (f) Supervise cover of a transmission line between a base station of the aforementioned (n-1) individual, and said terminal station, (g) a signal of data of a transmission line covered when said at least one transmission line was covered -- said at least one -- redundant -- between system base station n and said terminal station. [transmit and] The correspondence procedure for wireless LAN systems according to claim 1 or 2 including further each stage where data of a covered transmission line is compensated.

[Claim 6]A communication apparatus characterized by comprising the following for a wireless LAN system which communicates with the 1st transmission rate.

A rate conversion separation-ized means to generate a signal of the aforementioned (n-1) individual which divides a signal of said 1st transmission rate into a signal of an individual in time sharing (n-1), and has the 2nd transmission rate lower than said 1st transmission rate.

However, said 2nd transmission rate by which n was generated by 3 or more and said rate conversion separation-ized means.

[Claim 7]The communication apparatus for wireless LAN systems according to claim 6, wherein said 2nd transmission rate is 1 for said 1st transmission rate (n-1).

[Claim 8]At least one sum calculating means which generates a signal which added data of a signal of k (k<= (n-1)) individual for every arbitrary time slots at least among signals of the aforementioned (n-1) individual which has said 2nd transmission rate generated in said rate conversion separation-ized means, The communication apparatus for wireless LAN systems according to claim 6 or 7 having further at least one redundancy system base station n which transmits a signal generated by said at least one sum calculating means to said terminal station.

[Claim 9]A line monitoring means to supervise cover of a transmission line between at least one redundancy system base station n which transmits a signal to said terminal station, a base station of the aforementioned (n-1) individual, and said terminal station. The communication apparatus for wireless LAN systems according to claim 6 or 7 having further a switching means which transmits a signal of a covered transmission line to said at least one redundancy system base station n when said at least one transmission line is covered.

[Claim 10]A rate conversion separation-ized means to generate a signal of the aforementioned (n-1) individual which divides a signal of the 1st transmission rate into a signal of an individual in time sharing (n-1) (3 or more [However, n]), and has the 2nd transmission rate lower than said 1st transmission rate.

A base station of an individual (n-1) where at least one terminal transmits a signal of an individual which has said 2nd transmission rate generated by said rate conversion separation-ized means (n-1) to a connected terminal station, respectively.

A receiver which receives a signal which is the terminal station device for wireless LAN systems provided with the above, and has said 2nd transmission rate from a base station of the aforementioned (n-1) individual. It has a rate conversion multiplexing means which changes and multiplexes a signal which has said 2nd received transmission rate to said 1st transmission rate, and a necessary modulated wave versus a noise ratio of a transmission line between said terminal station and said each base station is reduced.

[Claim 11]A rate conversion separation-ized means to generate a signal of the aforementioned (n-1) individual which divides a signal of the 1st transmission rate into a signal of an individual in time sharing (n-1), and has the 2nd transmission rate lower than said 1st transmission rate.

A base station of an individual (n-1) where at least one terminal transmits a signal of an individual which has said 2nd transmission rate generated by said rate conversion separation-ized means (n-1) to a connected terminal station, respectively. 1st at least one sum calculating means that generates a signal which added data of a signal of k (k<= (n-1)) individual for every arbitrary time slots at least among signals of the aforementioned (n-1) individual which has said 2nd transmission rate generated in said rate conversion separation-ized means, At least one redundancy system base station n which transmits a signal generated by said 1st at least one sum calculating means to said terminal station.

A receiver which receives a signal which is the terminal station device for wireless

LAN systems provided with the above, and has said 2nd transmission rate from a base station of the aforementioned (n-1) individual, A rate conversion multiplexing means which changes and multiplexes a signal which has said 2nd received transmission rate to said 1st transmission rate, A line monitoring means to supervise cover of a transmission line between a base station of the aforementioned (n-1) individual, and said terminal station, 2nd at least one sum calculating means that generates a signal which added data of at least k signals for every arbitrary time slots among signals from a base station of the aforementioned (n-1) individual except for a signal of a covered transmission line when said at least one transmission line was covered, At least one difference calculation means to output difference of data of a signal from said redundancy system base station n, and data of said signal generated by said 2nd sum calculating means, It has a switching means which supplies a signal outputted by said difference calculation means to said rate conversion multiplexing means instead of a covered signal which was detected by said line monitoring means, Even when at least one of signals from a base station of the aforementioned (n-1) individual is covered, data of a covered signal is compensated.

[Claim 12]A rate conversion separation-ized means to generate a signal of the aforementioned (n-1) individual which divides a signal of the 1st transmission rate into a signal of an individual in time sharing (n-1), and has the 2nd transmission rate lower than said 1st transmission rate.
A base station of an individual (n-1) where at least one terminal transmits a signal of an individual which has said 2nd transmission rate generated by said rate conversion separation-ized means (n-1) to a connected terminal station, respectively.
At least one redundancy system base station n which transmits a signal to said terminal station.
The 1st line monitoring means that supervises cover of a transmission line between a base station of the aforementioned (n-1) individual, and said terminal station.
The 1st switching means that transmits a signal of a covered transmission line to said at least one redundancy system base station n when said at least one transmission line is covered.
A receiver which receives a signal which is the terminal station device for wireless LAN systems provided with the above, and has said 2nd transmission rate from a base station of the aforementioned (n-1) individual, The 2nd line monitoring means that supervises cover of a transmission line between a rate conversion multiplexing means which changes and multiplexes a signal which has said 2nd received transmission rate

to said 1st transmission rate, a base station of the aforementioned (n-1) individual, and said terminal station, Instead of being a signal of a transmission line covered when said at least one transmission line was covered. Even when it has the 2nd switching means that supplies a signal transmitted from said at least one redundancy system base station n to said rate conversion multiplexing means and at least one of signals from a base station of the aforementioned (n-1) individual is covered, data of a covered signal is compensated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the correspondence procedure for wireless LAN systems and communication apparatus which improved the transmission characteristic of data by the macro diversity which uses two or more base stations especially about the correspondence procedure for wireless LAN systems, and a communication apparatus.

[0002]

[Description of the Prior Art]In recent years, in the wireless LAN system using a millimeter wave belt (for example, 2.4 GHz - 60 GHz), broadband transmission of 100 or more Mbps is studied. In this case, the communication between a sending set and a receiving set needs to be line-of-sight communication (line-of-sight communication) on the propagation characteristic of a millimeter wave.

[0003]However, for example, with the wireless LAN system used in an office, the propagation path between a sending set and a receiving set has a possibility that it may be interrupted, and signal transmission is intercepted by movement of people in this case. The macro diversity is considered in order to avoid interception of this signal transmission.

[0004]Drawing 13 is a figure showing the composition of the conventional wireless LAN system which used the macro diversity. In the conventional wireless LAN system using this macro diversity, two or more base stations (for example, the base station 1 - a base station (n)) are installed to one terminal station connected to at least one terminal in an office. For example via HUB (device which performs network branching etc.) of ATM (asyncronous transfer mode), the signal from an external cable LAN system is transmitted to two or more base stations, and is simultaneously transmitted to a terminal station on further different frequency (f1-fn).

[0005]In a terminal station, the signal from two or more base stations is received, the optimal (for example, it is the highest-level) signal is chosen, and it restores to it. Thus, the interception of signal transmission mentioned above is avoidable by constituting two or more propagation paths between the transmitting side and a receiver. In order to constitute the wireless LAN system of drawing 13, it should be cautious of the same necessary C/N (ratio of the energy of a carrier signal and noise which were modulated) being substantially required to all the propagation paths.

[0006]

[Problem(s) to be Solved by the Invention]However, the following problems are among the conventional wireless LAN systems mentioned above. As mentioned above, in the wireless LAN system, the communication which has the access speed of 100 or more Mbps is studied. In the wireless LAN system shown in drawing 13, in order to realize spread spectrum transmission of 100 or more Mbps, it is necessary to attain the same necessary C/N substantially with the access speed of 100 or more Mbps in all the propagation paths. In order to satisfy the above-mentioned conditions, in all the base stations, an excessive transmission output needs to be needed, or it is necessary to increase further the profit of the antenna of all the base stations, or all the antennas of a terminal station.

[0007]Since only the number equivalent to the number of base stations is required for the number of subcarriers, a transmission band also increases only the number of base stations, and, as a result, it degrades efficient use of an electric wave. Also in broadband communication, the purpose of this invention provides the correspondence procedure for wireless LAN systems and communication apparatus which have a macro diversity function realizable in a low transmission output, low antenna gain, and a narrower transmission band in view of the above-mentioned problem.

[0008]

[Means for Solving the Problem]In order to solve an aforementioned problem, the following means was provided in this invention. It is a correspondence procedure for a wireless LAN system which communicates with the 1st transmission rate in an invention method according to claim 1, (a) Divide a signal of said 1st transmission rate into a signal of an individual (n-1) in time sharing. However, n changes each of a signal of 3 or more and the (b) aforementioned (n-1) individual into a signal of the 2nd transmission rate lower than said 1st transmission rate, (c) It has each stage where a base station of an individual (n-1) and at least one terminal transmit a signal of an individual (n-1) of said 2nd transmission rate between connected terminal stations, and a necessary modulated wave versus a noise ratio of a transmission line between

said terminal station and said base station is reduced.
[0009]In an invention method according to claim 2, said 2nd transmission rate is characterized by being 1 for said 1st transmission rate (n-1) in the correspondence procedure for wireless LAN systems according to claim 1. In the correspondence procedure for wireless LAN systems according to claim 1 or 2 with an invention method according to claim 3, Form said wireless LAN system further and at least one redundancy system base station n said correspondence procedure for wireless LAN systems, (d) a signal of data of each signal transmitted at least among the aforementioned (n-1) individuals between a base station of k (k<= (n-1)) individual, and said terminal station, and data which has a predetermined relation -- said terminal station and said at least one -- redundant -- between system base station n, [transmit and] (e) a case where one of the transmission lines between said at least k base stations and said terminal station is covered -- said at least one redundant system -- include further each stage where data of a covered transmission line is compensated, based on a signal transmitted between a base station and said terminal station
[0010]In an invention method according to claim 4, in the correspondence procedure for wireless LAN systems according to claim 3, a predetermined relation of said stage (d). Data of a signal transmitted between said terminal station and said at least one redundancy system base station is characterized by being the sum for every arbitrary time slots of data of each signal transmitted between said at least k base stations and said terminal station.
[0011]In the correspondence procedure for wireless LAN systems according to claim 1 or 2 with an invention method according to claim 5, Form said wireless LAN system further and at least one redundancy system base station n said correspondence procedure for wireless LAN systems, (f) Supervise cover of a transmission line between a base station of the aforementioned (n-1) individual, and said terminal station, (g) a signal of data of a transmission line covered when said at least one transmission line was covered -- said at least one -- redundant -- include further each stage where transmit between system base station n and said terminal station, and data of a covered transmission line is compensated
[0012]It is a communication apparatus for a wireless LAN system which communicates with the 1st transmission rate in the invention device according to claim 6, A rate conversion separation-ized means to generate a signal of the aforementioned (n-1) individual which divides a signal of said 1st transmission rate into a signal of an individual in time sharing (n-1), and has the 2nd transmission rate

lower than said 1st transmission rate. However, n has a base station of an individual (n-1) transmitted to a terminal station to which a signal of an individual for which it has said 2nd transmission rate generated by 3 or more and said rate conversion separation-ized means (n-1) was connected in at least one terminal, respectively. A necessary modulated wave versus a noise ratio of a transmission line between said terminal station and said each base station is reduced.

[0013]In the invention device according to claim 7, said 2nd transmission rate is characterized by being 1 for said 1st transmission rate (n-1) in the communication apparatus for wireless LAN systems according to claim 6. In the communication apparatus for wireless LAN systems according to claim 6 or 7 with the invention device according to claim 8. At least one sum calculating means which generates a signal which added data of a signal of k (k<= (n-1)) individual for every arbitrary time slots at least among signals of the aforementioned (n-1) individual which has said 2nd transmission rate generated in said rate conversion separation-ized means. It has further at least one redundancy system base station n which transmits a signal generated by said at least one sum calculating means to said terminal station.

[0014]In the communication apparatus for wireless LAN systems according to claim 6 or 7 with the invention device according to claim 9. A line monitoring means to supervise cover of a transmission line between at least one redundancy system base station n which transmits a signal to said terminal station, a base station of the aforementioned (n-1) individual, and said terminal station. When said at least one transmission line is covered, it has further a switching means which transmits a signal of a covered transmission line to said at least one redundancy system base station n.

[0015]In the invention device according to claim 10, a signal of the 1st transmission rate is divided into a signal of an individual in time sharing (n-1). (however, n with a rate conversion separation-ized means to generate a signal of the aforementioned (n-1) individual which has the 2nd transmission rate lower than or more 3) and said 1st transmission rate. It is said terminal station used in a wireless LAN system which has a base station of an individual (n-1) transmitted to a terminal station to which a signal of an individual which has said 2nd transmission rate generated by said rate conversion separation-ized means (n-1) was connected in at least one terminal, respectively. A receiver which receives a signal which has said 2nd transmission rate from a base station of the aforementioned (n-1) individual. It has a rate conversion multiplexing means which changes and multiplexes a signal which has said 2nd received transmission rate to said 1st transmission rate, and a necessary modulated wave versus a noise ratio of a transmission line between said terminal station and said

each base station is reduced.

[0016]A rate conversion separation-ized means to generate a signal of the aforementioned (n-1) individual which divides a signal of the 1st transmission rate into a signal of an individual in time sharing (n-1), and has the 2nd transmission rate lower than said 1st transmission rate in the invention device according to claim 11, A base station of an individual (n-1) where at least one terminal transmits a signal of an individual which has said 2nd transmission rate generated by said rate conversion separation-ized means (n-1) to a connected terminal station, respectively, 1st at least one sum calculating means that generates a signal which added data of a signal of k (k<= (n-1)) individual for every arbitrary time slots at least among signals of the aforementioned (n-1) individual which has said 2nd transmission rate generated in said rate conversion separation-ized means, It is said terminal station used in a wireless LAN system which has at least one redundancy system base station n which transmits a signal generated by said 1st at least one sum calculating means to said terminal station, A receiver which receives a signal which has said 2nd transmission rate from a base station of the aforementioned (n-1) individual, and a rate conversion multiplexing means which changes and multiplexes a signal which has said 2nd received transmission rate to said 1st transmission rate, A line monitoring means to supervise cover of a transmission line between a base station of the aforementioned (n-1) individual, and said terminal station, 2nd at least one sum calculating means that generates a signal which added data of at least k signals for every arbitrary time slots among signals from a base station of the aforementioned (n-1) individual except for a signal of a covered transmission line when said at least one transmission line was covered, At least one difference calculation means to output difference of data of a signal from said redundancy system base station n, and data of said signal generated by said 2nd sum calculating means, It has a switching means which supplies a signal outputted by said difference calculation means to said rate conversion multiplexing means instead of a covered signal which was detected by said line monitoring means, Even when at least one of signals from a base station of the aforementioned (n-1) individual is covered, data of a covered signal is compensated.

[0017]A rate conversion separation-ized means to generate a signal of the aforementioned (n-1) individual which divides a signal of the 1st transmission rate into a signal of an individual in time sharing (n-1), and has the 2nd transmission rate lower than said 1st transmission rate in the invention device according to claim 12, A base station of an individual (n-1) where at least one terminal transmits a signal of an individual which has said 2nd transmission rate generated by said rate conversion

separation-ized means (n-1) to a connected terminal station, respectively, The 1st line monitoring means that supervises cover of a transmission line between at least one redundancy system base station n which transmits a signal to said terminal station, a base station of the aforementioned (n-1) individual, and said terminal station, When said at least one transmission line is covered, it is said terminal station used in a wireless LAN system which has the 1st switching means that transmits a signal of a covered transmission line to said at least one redundancy system base station n, A receiver which receives a signal which has said 2nd transmission rate from a base station of the aforementioned (n-1) individual, The 2nd line monitoring means that supervises cover of a transmission line between a rate conversion multiplexing means which changes and multiplexes a signal which has said 2nd received transmission rate to said 1st transmission rate, a base station of the aforementioned (n-1) individual, and said terminal station, Instead of being a signal of a transmission line covered when said at least one transmission line was covered, Even when it has the 2nd switching means that supplies a signal transmitted from said at least one redundancy system base station n to said rate conversion multiplexing means and at least one of signals from a base station of the aforementioned (n-1) individual is covered, data of a covered signal is compensated.

[0018]An above-mentioned invention method and a device act as follows. In the correspondence procedure for wireless LAN systems according to claim 1 or 2, the communication apparatus for wireless LAN systems according to claim 6 or 7, and the terminal station device for wireless LAN systems according to claim 10, a high-speed transmission signal is changed more into a low-speed transmission signal, and is transmitted to a terminal station from two or more base stations. Therefore, under the same transmission output, a modulated wave versus a noise ratio (C/N) in a low-speed transmission signal becomes large compared with a high-speed transmission signal. That is, in order to obtain necessary C/N, more, in the case of a low-speed transmission signal, a transmission output of a base station can be reduced and antenna gain of a base station and a terminal station can also be reduced. Therefore, power consumption can be reduced and a further comparatively simple antenna can be used.

[0019]Among claims 3 thru/or 5, a correspondence procedure for wireless LAN systems given in any 1 paragraph, In the communication apparatus for wireless LAN systems according to claim 8 or 9, and the terminal station device for wireless LAN systems according to claim 11 or 12, In order to perform high-speed data communications, data of a transmission line which used two or more radio

transmission lines, and transmitted low-speed data more. and was intercepted using an additional redundancy system transmission line is compensated. Therefore, a compensation function of data of a transmission line which could reduce a transmission output and antenna gain, and was intercepted is also fully obtained. A wireless LAN system of consequential more high-speed data communications (broadband) is realizable.

[0020]Since a necessary zone of transmission between each base station and a terminal station can also be reduced, even if it takes into consideration a zone required for a redundancy system base station, an operating frequency band can be reduced substantially. In particular, in the correspondence procedure for wireless LAN systems according to claim 5, the communication apparatus for wireless LAN systems according to claim 9, and the terminal station device for wireless LAN systems according to claim 12, a signal of an intercepted transmission line can be freely assigned to a redundancy system transmission line. Therefore, even if same number as the number of redundancy system transmission lines of transmission lines are covered simultaneously, signal data of an intercepted transmission line can be compensated efficiently.

[0021]

[Embodiment of the Invention]The 1st example of the wireless LAN system concerning this invention is described to the beginning using drawing 1 - drawing 5. Drawing 1 is a block distribution diagram of the 1st example of the wireless LAN system concerning this invention. Drawing 2 is a figure explaining operation of the data rate converter shown in drawing 1. (A) shows an input signal, (B) shows the signal after time sharing, and (C) shows the output signal to each base station. Drawing 3 is a figure showing the predetermined relation between the signal data to the base stations 1-3 in (C) of drawing 2, and the signal data to the redundancy system base station n. Drawing 4 is a figure showing the data rate converter and the example of composition of a base station which are shown in drawing 1, and drawing 5 is a figure showing the example of composition of the terminal station shown in drawing 1.

[0022]In the office in the wireless LAN system of this invention in drawing 1, two or more base stations (in this case, the base station 1, the base station 2, the base station k (=3), a base station (n)) are installed to the one terminal station 10 connected to at least one terminal. In the example shown in drawing 1, the base station n is used as a redundancy system base station (it explains in detail later). The signal from an external cable LAN system is inputted into the data rate converter 20 via HUB of ATM. This input signal is shown by (A) of drawing 2. This input signal

includes the signal for terminal B, the signal for terminal A, and the signal for terminal C besides a recognition signal.

[0023]Some cases exist in the connecting relation of the terminal station 10 and terminal A-C. For example, in one case, it has each terminal for every terminal station. In other cases, one terminal station can also have two or more terminals. Also in which case, each data is appropriately supplied to each terminal by the address attached to each data.

[0024]In the data rate converter 20, as shown in (B) of drawing 2, the recognition signal and each signal for terminals which were included in the input signal are divided into three signals for the base station 1 - k (this example k= 3) in time sharing for every suitable time slot. As shown in (C) of drawing 2, the speed of three divided signals is changed into a signal (in this case, 1/3 of the data rate of an input signal) later than the data rate of an input signal. That is, generally the data rate of an input signal is changed into 1 for the number (n-1) of a base station (drawing 1 k=n-1).

[0025]As shown in (C) of drawing 2, the data of four signals divided for the redundancy system base station n and the data which has a predetermined relation are generated. For example, as shown in drawing 3, the signal data for the redundancy system base station n is set up as the sum of the base station 1 - three signal data to k.

[0026]The above operation can be performed by the example of the data rate converter 20 shown in drawing 4. In the rate conversion separation-ized circuit 22 changed by the data rate converter 20 of drawing 4, It is changed into the signal shown by (C) of drawing 2 from the signal shown by (A) of drawing 2, the base station 1 - three signal data to k are added in the sum arithmetic circuit 24, and the signal data of the redundancy system base station n is generated. In drawing 4, when the transmission signal of 156Mbps is supplied from cable LAN via ATM-HUB, the transmission signal of 156Mbps/3=52Mbps is transmitted to the base stations 1-3 and the redundancy system base station n, respectively, for example.

[0027]Next, four signals by which were shown by (C) of drawing 2, and depended and speed change was carried out low are transmitted to the terminal station 10 via the base stations 1-3 and the redundancy system base station n, respectively. the antenna which is equivalent to the number of base stations in the terminal station 10 -- and it ******** and the four above-mentioned signals are received, respectively.

[0028]As shown in drawing 5, the terminal station 10 has the rate conversion multiplexing circuit 11, and changes the access speed of three signals (in this case, 52Mbps) from the base station 1 - the base station 3 there, and it is multiplexed, and reproduces the high-speed original signal (the signal, 156Mbps which are shown in (A)

of drawing 2). The signal of 156Mbps includes the signal for terminal A, the signal for terminal B, and the signal for terminal C. When the terminal A is connected to the terminal station 10, only the signal for terminal A is supplied to the terminal A from the signal of these 156Mbps.

[0029]As mentioned above, in the wireless LAN system of this invention, the high-speed transmission signal from cable LAN is changed more into a low-speed transmission signal, and is transmitted to the terminal station 10 from two or more base stations. Therefore, under the same transmission output, a modulated wave versus the noise ratio (C/N) in a low-speed transmission signal becomes large compared with a high-speed transmission signal. That is, in order to obtain necessary C/N, more, in the case of a low-speed transmission signal, the transmission output of a base station can be reduced and the antenna gain of a base station and a terminal station can also be reduced. Therefore, power consumption can be reduced and a further comparatively simple antenna can be used.

[0030]Next, in the wireless LAN system concerning this invention, operation when one of three transmission lines between the base stations 1-3 and the terminal station 10 is intercepted is explained. Below, as shown in drawing 1, the case where the transmission line between the base station 3 and the terminal station 10 is intercepted is explained, for example.

[0031]In the terminal station 10 shown in drawing 5, three signals from the base station 1 - the base station 3 are supervised by the interruption detection circuit 12-1, 12-2, and 12-3, respectively, and can detect which transmission line was intercepted by the interruption detection control circuit 14. The interruption detection circuit 12-1, 12-2, and 12-3 can consist of RF level detectors etc. easily, for example. Three signals from the base station 1 - the base station 3 are added for every predetermined time slot in the sum arithmetic circuit 13 like the sum arithmetic circuit 24 of the data rate converter 20 of drawing 4. In this case, when the signal data from the intercepted transmission line is random data substantially by noise, by the control from the interruption detection control circuit 14, the signal data of the intercepted transmission line is not added to addition, or is set as all zero.

[0032]Therefore, in the difference calculation circuit 15, if the data added in the sum arithmetic circuit 13 is subtracted from the signal data transmitted from the redundancy system base station n, the difference calculation circuit 15 can output the right signal data of the intercepted transmission line. And right signal data can be inserted in the intercepted transmission line from the difference calculation circuit 15 by controlling the switching circuit 16 by the interruption detection control circuit 14.

[0033]The above-mentioned operation can generally be expressed with the following formula.
Data k= data n- (data 1+ ... data (k-1) + data (k+1) + ... data (n-1)), however data in which the data i is transmitted to the terminal station 10 from the base station i.
[0034]It becomes possible to compensate the signal data of the intercepted transmission line by the above operation. High-speed data was transmitted using two or more radio transmission lines, and the data of the intercepted transmission line was compensated with the wireless LAN system using the conventional macro diversity by the data of other transmission lines. However, in order to perform the same high-speed data communications, more, in low-speed data, it uses and transmits and the data of the intercepted transmission line is compensated [radio transmission lines / two or more] with the wireless LAN system of this invention using an additional redundancy system transmission line. Therefore, as mentioned above, the compensation function of the data of the transmission line which could reduce a transmission output and antenna gain, and was intercepted is also fully obtained. The wireless LAN system of consequential more high-speed data communications (broadband) is realizable.
[0035]In the wireless system concerning above-mentioned this invention, the predetermined relation to the data rate converter 20 of drawing 1 is not limited to peace operation. Namely, what is necessary is just to be able to specify the data from the whole signal data, when the data of the intercepted transmission line exists.
[0036]Next, the 2nd example of the wireless LAN system concerning this invention is described using drawing 6 - drawing 8. Drawing 6 is a block distribution diagram of the 2nd example of the wireless LAN system concerning this invention. Drawing 7 is a figure showing the data rate converter and the example of composition of a base station which are shown in drawing 6, and drawing 8 is a figure showing the example of composition of the terminal station shown in drawing 6.
[0037]The 2nd example of the wireless LAN system shown in drawing 6 has the substantially same operation as the 1st example of the wireless LAN system shown in drawing 1. the base station 1 usual [two or more] with the wireless LAN system shown in drawing 6 - (n-1) (only the base station 1 and the base station 2 are shown on account of explanation by the example of drawing 6) others -- two or more redundant systems -- the base station (the base station n, a base station (n+1)) is provided.
[0038]Namely, the signal (for example, 156Mbps) transmitted via ATM-HUB in the example of drawing 6 from cable LAN. In the data rate converter 40, it is divided into

the signal of the individual to base station 1- (n-1) (n-1) as well as operation of the data rate converter 20 of drawing 1, and is changed into a lower data rate (for example, 156/(n-1)Mbps). The above-mentioned operation is performed in the rate conversion separation-ized circuit 42 shown in drawing 7.

[0039]In [in the data rate converter 40, the signal for the usual base station of an individual (n-1) is divided into two groups (for example, the even-numbered base station, the odd-numbered base station), and] the sum arithmetic circuit 44-1 and 44-2, it is added for every predetermined time slot, respectively, and redundant -- system base station n and a redundant system -- a base station (n+1) -- two signals of business are generated.

[0040]The signal by which rate conversion was carried out in the data rate converter 40 is transmitted by the terminal station 30 by a narrow band via base station 1- (n-1), n, and (n+1), respectively. In the terminal station 30, the signal received from base station 1- (n-1) is sent to the rate conversion multiplexing circuit 31. The received signal is changed into the signal of the original high speed (156Mbps), and the rate conversion multiplexing circuit 31 multiplexes it, and generates the original signal sent from cable LAN.

[0041]Like the terminal station 10 shown in drawing 5, the terminal station 30 has provided the interruption detection circuit 32-1 - 32- (n-1) in the transmission line over base station 1- (n-1), respectively, and can detect which transmission line was intercepted by the interruption detection control section 34. Like the data rate converter 40, the signal from base station 1- (n-1) is divided into two groups (in this case, signal from the even-numbered base station and the odd-numbered base station), and is added for every predetermined time slot in the sum arithmetic circuit 33-1 and 33-2, respectively. Since the signal data from the intercepted transmission line is random data substantially by noise when arbitrary transmission lines are intercepted at this time, by the control from the interruption detection control circuit 34, the signal data of the intercepted transmission line is not added to addition, or is set as all zero.

[0042]If the sum arithmetic circuit 33-1 and the data added in 33-2 are subtracted from the signal data transmitted from the redundancy system base station n and (n+1) in the difference calculation circuit 35-1 and 35-2, respectively, The difference calculation circuit 35-1 and 35-2 can output the right signal data of the intercepted transmission line. And right signal data can be inserted in the intercepted transmission line from the difference calculation circuit 35-1 and 35-2 by controlling the switching circuit 36 by the interruption detection control circuit 34.

[0043]That is, when the transmission line over the odd-numbered base station is intercepted, right signal data is inserted by the difference calculation circuit 35-1, and when the transmission line over the even-numbered base station is intercepted, right signal data is inserted by the difference calculation circuit 35-2.
[0044]Even if it can have an advantage by low rate wireless transfer and two more transmission lines (setting in a different group) are simultaneously intercepted like the wireless LAN system of drawing 1, the signal data of the intercepted transmission line can be compensated with the above wireless LAN system. In the wireless LAN system shown in drawing 6, the transmission line between a base station and the terminal station 30 was divided into two groups, and two redundancy system base stations were provided. However, the compensation characteristic of the intercepted data can be improved by providing much more a group's transmission lines and redundancy system base stations.
[0045]Next, the 3rd example of the wireless LAN system concerning this invention is described using drawing 9 and drawing 10. Drawing 9 is a block distribution diagram of the 3rd example of the wireless LAN system concerning this invention. Drawing 10 is a figure showing the data rate converter and the example of composition of a base station (or terminal station) which are shown in drawing 9. That is, the terminal station 50 has the substantially same composition as the data rate converter and base station which are shown in drawing 10.
[0046]In the office in the wireless LAN system of this invention in drawing 9, two or more base stations (in this case, the base station 1 - a base station (n)) are installed to the one terminal station 50 connected to at least one terminal. In the example shown in drawing 9, the base station n is used as a redundancy system base station (it explains in detail later). Two-way communication is performed between each base station and the terminal station 50. Therefore, as shown in drawing 10, the transmitter-receiver, the rate conversion separation-ized circuit, and the rate conversion multiplexing circuit are established in each of each base station side device (the data rate converter 60 is included) and the terminal station 50.
[0047]Also in a base station side, the cut off state of a transmission line can be supervised by supervising the transmission line of going up to a base station from the terminal station 50 for two-way communication. Therefore, the interruption detection circuit 66-1, 66-k, 66- (n-1), and the upstream surveillance that comprises the interruption detection control section 67 are further established in the data rate converter 60.
[0048]Operation of the wireless LAN system in drawing 9 is explained below. The

signal from an external cable LAN system is inputted into the data rate converter 60 via HUB of ATM. This input signal is divided into two or more signals which have a transmission rate of 1/(n-1) like the 1st example of the wireless LAN system of drawing 1, and they are transmitted to the terminal station 50 via base station 1-(n-1).

[0049]However, the signal to the redundancy system base station n can assign one of the base station 1 - (n-1) signals by the switching circuit 64 in this case. In the terminal station 50, like operation of the wireless LAN system shown in drawing 1, the signal received from base station 1- (n-1) is sent to a rate conversion multiplexing circuit, is changed into the signal of the original high speed (156Mbps), and is multiplexed, and generates the original signal sent from cable LAN.

[0050]Similarly the signal changed and divided more into the low rate in the terminal station 50 for two-way communication, It is transmitted to each base station 1- (n-1), and in the rate conversion multiplexing circuit 61 of the data rate converter 60, it is changed into the high-speed original signal, and multiplexes, and the signal sent out to cable LAN is generated.

[0051]Here, as shown in drawing 9, when the transmission line between the base station k and the terminal station 50 is intercepted, the intercepted transmission line is distinguished by the upstream surveillance in the data rate converter 60. Then, the data (data of the base station k) of the intercepted transmission line is sent to the base station n by the switching circuit 64, and is further transmitted to the terminal station 50.

[0052]In the terminal station 50, since the same composition gets down and it has a line monitoring mechanism, the intercepted transmission line can be distinguished. Therefore, the data transmitted from the base station n is used by the switching circuit (equivalent to the switching circuit 63 of the data rate converter 60) instead of the data from the base station k. In the above-mentioned operation, the transmission line which the terminal station 50 got down and was intercepted using the line monitoring mechanism was distinguished in the terminal station 50. However, if the information on the transmission line distinguished by uphill look surveillance is included in the data from the base station n, it is also possible to control a switching circuit by the information.

[0053]Next, the 4th example of the wireless LAN system concerning this invention is described using drawing 11 and drawing 12. Drawing 11 is a block distribution diagram of the 4th example of the wireless LAN system concerning this invention. Drawing 12 is a figure showing the data rate converter and the example of composition of a base

station (or terminal station) which are shown in drawing 11. That is, the terminal station 70 has the substantially same composition as the data rate converter and base station which are shown in drawing 11.

[0054]The 4th example of the wireless LAN system shown in drawing 11 has the substantially same operation as the 3rd example of the wireless LAN system shown in drawing 9. the base station 1 usual [two or more] with the wireless LAN system shown in drawing 11 - (n-1) (only the base station 1 and the base station 2 are shown on account of explanation by the example of drawing 11) others -- two or more redundant systems -- the base station (the base station n, a base station (n+1)) is provided.

[0055]In the example of drawing 11, the signal transmitted via ATM-HUB from cable LAN, The operation transmitted to the terminal station 70 via the data rate converter 80 and base station 1- (n-1), And the operation transmitted to cable LAN via base station 1- (n-1) and the data conversion circuit 80 has the substantially [as operation of the 3rd example of the wireless LAN system shown in drawing 9] the same signal outputted from the terminal station 70. Therefore, between the base station 1, and - (n-1) and the terminal station 70, a signal can be transmitted with a lower data rate.

[0056]Unlike the 3rd example of drawing 9, in the 4th example of drawing 11, the redundancy system base station (n+1) is provided additionally. it is shown in drawing 12 -- as -- this redundant system -- a base station (n+1) is redundant -- it is connected to the switching circuit 84 with system base station n. the switching circuit 84 -- the interruption detection circuit 86-1, 86-k, 86- (k+1), and .. by 86- (n-1) and the upstream surveillance which consists of the interruption detection control circuit 87. The data sent to the base station of the intercepted transmission line is controlled to be sent to the redundancy system base station n or a redundancy system base station (n+1).

[0057]also being related with an uphill circuit -- the same -- this redundant system -- a base station (n+1) is redundant -- it is connected to the switching circuit 83 with system base station n. In the switching circuit 83, the data sent from the redundancy system base station n or a redundancy system base station (n+1) is chosen by upstream surveillance instead of the data sent to the base station of the intercepted transmission line, and the rate conversion multiplexing circuit 81 is supplied.

[0058]instead redundant, when one of the transmission lines between the base station 1, and - (n-1) and the terminal station 70 is intercepted in the above-mentioned operation -- redundant to instead of [those], when system base station n is used and two of said transmission lines are intercepted simultaneously -- system base

station n and (n+1) are used.
[0059]As shown above, even if it can have an advantage by low rate wireless transfer and further two or more transmission lines are simultaneously intercepted like the wireless LAN system of drawing 9, the signal data of the intercepted transmission line can be efficiently compensated with the 4th example of a wireless LAN system.
[0060]Two redundancy system base stations are provided in the 4th example of the wireless LAN system shown in drawing 11. However, it becomes possible to compensate many intercepted data more, having an advantage of low rate transmission, if much more redundancy system base stations are provided. As mentioned above, although the example of this invention explained, this invention is not limited to these examples and it cannot be overemphasized that improvement and modification are possible within the limits of this invention.
[0061]
[Effect of the Invention]As mentioned above, according to this invention, it has an effect taken below. In the correspondence procedure for wireless LAN systems according to claim 1 or 2, the communication apparatus for wireless LAN systems according to claim 6 or 7, and the terminal station device for wireless LAN systems according to claim 10, a high-speed transmission signal is changed more into a low-speed transmission signal, and is transmitted to a terminal station from two or more base stations. Therefore, under the same transmission output, a modulated wave versus the noise ratio (C/N) in a low-speed transmission signal becomes large compared with a high-speed transmission signal. That is, in order to obtain necessary C/N, more, in the case of a low-speed transmission signal, the transmission output of a base station can be reduced and the antenna gain of a base station and a terminal station can also be reduced. Therefore, power consumption can be reduced and a further comparatively simple antenna can be used.
[0062]Among claims 3 thru/or 5, a correspondence procedure for wireless LAN systems given in any 1 paragraph, In the communication apparatus for wireless LAN systems according to claim 8 or 9, and the terminal station device for wireless LAN systems according to claim 11 or 12, In order to perform high-speed data communications, the data of the transmission line which used two or more radio transmission lines, and transmitted low-speed data more, and was intercepted using the additional redundancy system transmission line is compensated. Therefore, the compensation function of the data of the transmission line which could reduce a transmission output and antenna gain, and was intercepted is also fully obtained. The wireless LAN system of consequential more high-speed data communications

(broadband) is realizable.

[0063]Since the necessary zone of transmission between each base station and a terminal station can also be reduced, even if it takes into consideration a zone required for a redundancy system base station, an operating frequency band can be reduced substantially. In particular, in the correspondence procedure for wireless LAN systems according to claim 5, the communication apparatus for wireless LAN systems according to claim 9, and the terminal station device for wireless LAN systems according to claim 12, the signal of the intercepted transmission line can be freely assigned to a redundancy system transmission line. Therefore, even if same number as the number of redundancy system transmission lines of transmission lines are covered simultaneously, the signal data of the intercepted transmission line can be compensated efficiently.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]The block distribution diagram of the 1st example of the wireless LAN system concerning this invention.

[Drawing 2]The figure explaining operation of the data rate conversion method shown in drawing 1. As for an input signal and (B), in (A), the signal after time sharing and (C) are the output signals to each base station.

[Drawing 3]The figure showing the predetermined relation between the signal data to the base stations 1-3 in (C) of drawing 2, and the signal data to the redundancy system base station n.

[Drawing 4]The figure showing the data rate conversion method and the example of composition of a base station which are shown in drawing 1.

[Drawing 5]The figure showing the example of composition of the terminal station shown in drawing 1.

[Drawing 6]The block distribution diagram of the 2nd example of the wireless LAN system concerning this invention.

[Drawing 7]The figure showing the data rate converter and the example of composition of a base station which are shown in drawing 6.

[Drawing 8]The figure showing the example of composition of the terminal station shown in drawing 6.

[Drawing 9]The block distribution diagram of the 3rd example of the wireless LAN system concerning this invention.

[Drawing 10]The figure showing the data rate converter and the example of composition of a base station (or terminal station) which are shown in drawing 9.
[Drawing 11]The block distribution diagram of the 4th example of the wireless LAN system concerning this invention.
[Drawing 12]The figure showing the data rate converter and the example of composition of a base station (or terminal station) which are shown in drawing 11.
[Drawing 13]The figure showing the composition of the conventional wireless LAN system using a macro diversity.
[Description of Notations]
10 Terminal station
11 Rate conversion multiplexing circuit
12-1-12-3 Interruption detection circuit
13 Sum arithmetic circuit
14 Interruption detection control circuit
15 Difference calculation circuit
20 Data rate converter
22 Rate conversion separation-ized circuit
24 Sum arithmetic circuit
30 Terminal station
11 Rate conversion multiplexing circuit
32-1-32- (n-1) Interruption detection circuit
33-1 and 33-2 Sum arithmetic circuit
34 Interruption detection control circuit
35-1 and 35-2 Difference calculation circuit
36 Switching circuit
40 Data rate converter
42 Rate conversion separation-ized circuit
44-1 and 44-2 Sum arithmetic circuit
50 Terminal station
60 Data rate converter
61 Rate conversion multiplexing circuit
62 Rate conversion separation-ized circuit
63 Switching circuit
64 Switching circuit
66-1-66- (n-1) Interruption detection circuit
67 Interruption detection control circuit

70 Terminal station

80 Data rate converter

81 Rate conversion multiplexing circuit

82 Rate conversion separation-ized circuit

83 Switching circuit

84 Switching circuit

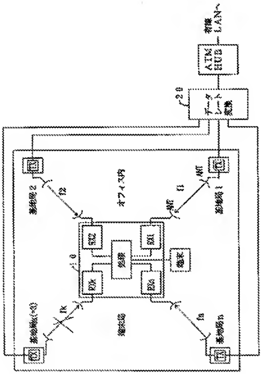
86-1-86- (n-1) Interruption detection circuit

87 Interruption detection control circuit

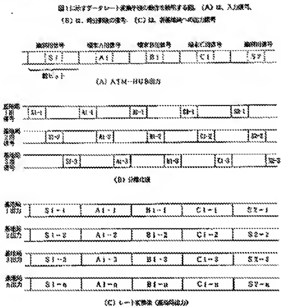
DRAWINGS

[Drawing 1]

本発明に係わる無線LANシステムの第1実施例のブロック系統図



[Drawing 2]



[Drawing 3]

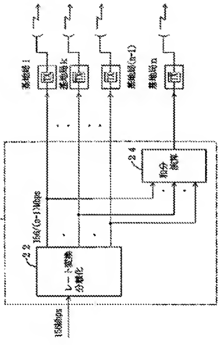
図2の（C）における基地局1～3への信号データと冗長

系基地局nへの信号データとの所定の関係を示す図

基地局1	1 1 0 0 1 0 1 0 1 1 0 0 1 0 0 1
基地局2	0 1 1 0 0 0 1 1 0 1 0 1 0 0 1 1
基地局3	+ 1 1 0 1 1 0 0 1 1 0 0 1 0 1 1 0
基地局n	0 1 1 1 0 0 0 0 0 0 0 0 1 1 0 0

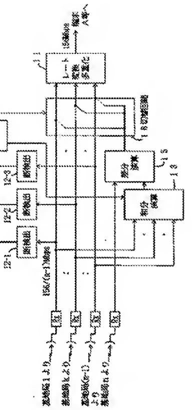
[Drawing 4]

図１に示すデータレート変換手段及び基地局の構成例を示す図



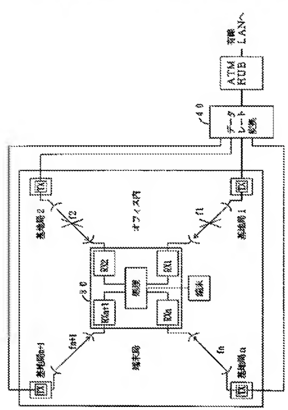
[Drawing 5]

図1に示す端末局の構成例を示す図



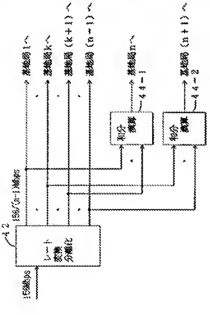
[Drawing 6]

本発明に係わる無線ＬＡＮシステムの第２実施例のブロック系統図



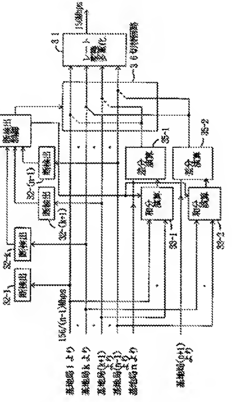
[Drawing 7]

図６に示すデータレート変換部及び基地局の構成例を示す図



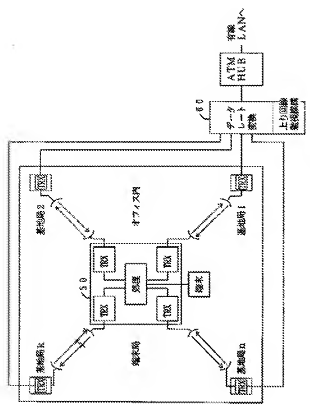
[Drawing 8]

図８に示す端末局の構成例を示す図



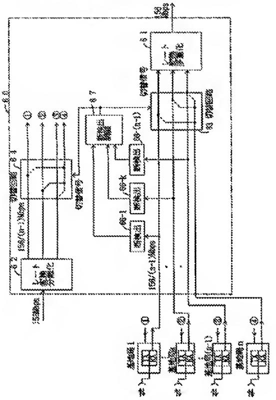
[Drawing 9]

本発明に係わる無線ＬＡＮシステムの第３実施例のブロック構成図



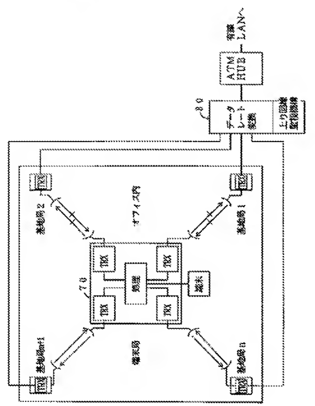
[Drawing 10]

図９に示すデータレート変換部及び基地局（或いは端末局）の構成例を示す図



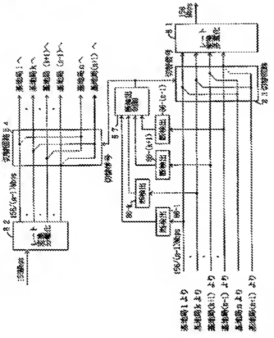
[Drawing 11]

本発明に係わる無線ＬＡＮシステムの第４実施例のブロック系統図



[Drawing 12]

図１１に示すデータレート変換部及び基地局（或いは端末局）の構成例を示す図



[Drawing 13]

マクロダイバーシティを用いた従来の無線ＬＡＮシステムの構成を示す図